**Lei He** 127 West Youyi Road, Beilin District

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**RESEARCH INTERESTS**

Navigation and Control System Design for Unmanned Aerial Vehicle

Deep Reinforcement Learning for Robotics

Explainable Artificial Intelligence

Bio-inspired Computer Vision

**EDUCATION**

* **Ph.D. in Aircraft Design: Northwestern Polytechnical University (NWPU), China**

***Sep 2015 - Aug 2023***

School of Aeronautics

Overall GPA 82/100, ranking 12th of 26

Direct Ph.D. project without a master’s degree

Supervised by Prof. Bifeng Song (The Changjiang Scholar award)

**Ph.D. Thesis:** Autonomous Obstacle Avoidance Flight of Bird-like Flapping Wing Micro Aerial Vehicle based on Deep Reinforcement Learning

* **Visiting Ph.D. student: Cranfield University, UK *Feb 2019 - Dec 2020***

School of Aerospace, Transport and Manufacturing

Supported by China Scholarship Council. (No. 201806290175)

* **B.Eng. in Aircraft Design: Northwestern Polytechnical University (NWPU), China**

***Sep 2011 - Jun 2015***

**Honors College,** overall GPA 86/100, ranking 20th of 76

**REASEARCH EXPERIECNE**

* **Robotics, Autonomy and Machine Intelligence (RAMI) Group**

**City, University of London *Apr 2020 - Dec 2020***

Orbital AI-based Autonomous Refuelling (OIBAR) project

Supported by European Space Agency (ESA)

Working as a research assistant (part-time) for AI-based target detection and docking mechanism design

Supervised by Prof. Nabil Aouf

* **NWPU Micro Vehicle Research Lab *Sep 2014 - Aug 2023***

Modelling and control system design for bio-inspired flapping wing aerial vehicles

Light-weight Vision-based obstacle avoidance system design

Vertical Take-off and Landing (VTOL) UAVs design and control

Supervised by Prof. Bifeng Song

* **Dynamics, Simulation & Control Group, Cranfield University *Feb 2019 - Dec 2020***

Deep reinforcement learning based visual navigation and collision avoidance

Explainable deep reinforcement learning for UAV path planning

Supervised by Prof. Nabil Aouf and Dr. James F. Whidborne

* **Shaanxi Province Key Lab of Speech & Image Information Processing (SAIIP)**

***May 2014 - Aug 2014***

Audio, speech and language processing using machine learning

Supervised by Prof. Lei Xie

* **NWPU Intelligent Car Lab *Aug 2013 - Mar 2015***

Automatic driving and tracking system for intelligent car using computer vision

Supported by China National Innovation Experiment Program for college students

Supervised by Prof. Shiru Qu

**PUBLICATIONS (**[**https://scholar.google.com/citations?user=QGwYalkAAAAJ&hl=zh-CN**](https://scholar.google.com/citations?user=QGwYalkAAAAJ&hl=zh-CN)**)**

* **Lei He**, Aouf Nabil, and Bifeng Song. Explainable Deep Reinforcement Learning for UAV Autonomous Navigation. **Aerospace science and technology 2021**
* **Lei He**, Nabil Aouf, James Whidborne, Bifeng Song, Integrated moment-based LGMD and deep reinforcement learning for UAV obstacle avoidance. **ICRA 2020**.
* **Lei He,** Duarte Rondao, Nabil Aouf. A Novel Mechanism for Orbital AI-based Autonomous Refuelling. **AIAA SCITECH 2023 Forum**
* **Lei He**, Nabil Aouf, James Whidborne, Bifeng Song, Deep Reinforcement Learning based Local Planner for UAV Obstacle Avoidance using Demonstration Data. **preprint 2020**
* Changhao Chen, Bifeng Song, Shuhui Bu, **Lei He**. An improved point feature‐based sparse stereo vision. **IET Image Processing 2022**
* Shi Qian Liu, James F Whidborne, **Lei He**. Backstepping sliding-mode control of stratospheric airships using disturbance-observer. **Advances in Space Research 2021**
* Siqi Wang, Bifeng Song, **Lei He**, Xinyu Lang. Modeling and robust attitude controller design of a distributed propulsion tilt-wing UAV in hovering flight. **CCDC 2019**
* Siqi Wang, Bifeng Song, **Lei He**. Robust attitude control system design for a distributed propulsion tilt-wing uav in flight state transition. **APISAT 2018**
* Bifeng Song, **Lei He**, Chen Wang, Wenqing Yang, A multi power fusion flight control system applied to micro UAV. ZL 2015 1 0990837.X **（China Patent 2015）**

**INTERN/EXCHANGE EXPERIENCE**

* **Sanyi UAS Co. Ltd, Xi’an, Shaanxi, China *Aug 2016 - Dec 2018***

Assistant flight control engineer

Participate in design and flight test of several industrial UAVs

* **National Taiwan University of Science and Technology, Taipei, Taiwan**

***Aug 2013 - Jan 2014***

Exchange student in Department of Computer Science and Information Engineering

Major in Computer Science and Software Engineering

**HONORS / AWARDS**

First Class Scholarship of NWPU ***2012, 2013, 2014***

First prize of NWPU Intelligent Car Competition  ***2012***

Second prize of the Freescale National College Students’ Intelligent Car Competition ***2012***

Excellent achievements of National Innovation Experiment Program for college students ***2015***

**SKILLS**

* **UAV control system design, simulation and real flight test**

Python, C++, MATLAB, Simulink

PX4 open-source flight stack development

ROS and Linux programming

UAV operation for 8 years (including fixed-wing, flapping-wing, quadrotor and VTOL)

* **Deep reinforcement learning**

TensorFlow, PyTorch

**HOBBIES**

Sports, aviation spot and photography

**REFEREES**

* **Professor Bifeng Song**

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* **Professor Nabil Aouf**

School of Science & Technology, City, university of London

Phone: +44 (0)20 7040 5168 Email: [nabil.aouf@city.ac.uk](mailto:nabil.aouf@city.ac.uk)

* **Professor James Whidborne**

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